

REMARKS

Rejections Under 35 USC §103

Claims 25, 35, 47 and 51 have been rejected under 35 USC §103(a) as being unpatentable over Chou et al. (US Patent No. 5,691,568).

Claims 26, 27, 29, 30, 32, 33, 36, 37, 48-50, 52 and 53 have been rejected under 35 USC §103(a) as being unpatentable over Chou et al. (US Patent No. 5,691,568) in view of Rostoker et al. (US Patent No. 6,181,011).

Claims 28, 38 and 39 have been rejected under 35 USC §103(a) as being unpatentable over Chou et al. (US Patent No. 5,691,568) in view of Rowe et al. (US Patent No. 4,739,448).

Claim 31 has been rejected under 35 USC §103(a) as being unpatentable over Chou et al. (US Patent No. 5,691,568) and Rostoker et al. (US Patent No. 6,181,011) as applied to claim 30, and further in view of Rowe et al. (US Patent No. 4,739,448).

Claim 34 has been rejected under 35 USC §103(a) as being unpatentable over Chou et al. (US Patent No. 5,691,568) and Rostoker et al. (US Patent No. 6,181,011) as applied to claim 30, and further in view of Pedder (US Patent No. 5,717,245).

The rejections under 35 USC §103 are traversed for the reasons to follow.

Summary of the Invention

Claims 25-39 and 47-53 are directed to a "semiconductor component". The component includes a substrate 10 (Figure 2), and a conductive layer 14 (Figure 2) substantially covering a surface of the substrate 10.

In addition, the component includes conductors 16 (Figure 2) on the surface, and a semiconductor die 20 (Figure 2E, 3A or 7) in electrical communication with the conductors 16. Each conductor 16 is defined by a pair of grooves 15 (Figure 2) which comprise ablated portions of the conductive layer 14. As shown in Figure 2C, the conductors 16 comprise portions of the conductive layer 14 separated by the grooves 15, and by remaining portions of the conductive layer 14 having edges defined by the grooves 15.

35 USC §103(a) Rejections Of Claims 25, 35, 47 and 51 Over Chou et al.

Independent claims 25, 35 and 47 have been amended to emphasize features which further distinguish the claimed component from Chou et al. and the prior art.

Amended independent claim 25 recites the substrate has "a chip scale surface". Antecedent basis for the "chip scale" recitation is contained on page 4, lines 11-12 of the specification. This recitation is intended to define the size of the substrate 10BGA (Figure 7B) as being about the same as that of the die 20 (Figure 7B).

Amended independent claim 25 also recites "a plurality of grooves through the conductive layer to the surface configured to define a shape and a spacing of each conductor, each groove having a micron sized width such that the conductors and the second portions substantially cover the surface". Antecedent basis for the "through the conductive layer" recitation is contained on page 8, lines 15-17 of the specification. Antecedent basis for the "micron sized width" recitation is contained on page 9, lines 9-13 of the specification.

These recitations are intended to emphasize the micron scale of the grooves 15 (Figure 2B) relative to the chip

scale (e.g., millimeters) of the substrate 10 (Figure 2B). Because the grooves 15 (Figure 2B) are small relative to the size of the substrate 10 (Figure 2B), the conductors 22 (Figure 2B) and the second portions of the conductive layer 14 (Figure 2B) cover almost the entire substrate 10 (Figure 2B). One advantage of this construction is that a chip scale component (e.g., package 72-Figure 7B) can include a substrate almost completely covered by the conductive layer 14 (Figure 2B). This provides improved heat transfer and rigidity in a chip scale component.

In Chou et al. elements 512, 1001a, 1001b, 1001c and 1001d in Figure 10B, and elements 1180 and 511c in Figure 11A, were cited as being equivalent to the present conductive layer 14. However these elements are not defined and separated by micron sized grooves, and do not substantially cover the surface of a chip scale substrate as presently claimed.

As exemplified by Chou et al., the conventional wisdom in the art is to remove all portions of a conductive layer (e.g., etching of a blanket deposited layer) which do not form the conductors or mounting paddle for the die. However, the present invention makes the grooves as small as possible so that most of the conductive layer remains. This provides a component with improved heat transfer and rigidity. In addition, the component can be fabricated using the patented laser fabrication method of the invention. These features exhibit an insight running contrary to the teachings of the prior art, and are indicative of the unobviousness of the presently claimed component.

Amended independent claim 35 includes the recitation of "each groove having a same micron sized width". Amended

independent claim 47 includes the recitation of "each groove having a width of about 5 μ m". Antecedent basis for these recitations is contained on page 9, lines 9-15 of the specification, and in Figures 2 and 2A-2D of the drawings.

In Chou et al. there are no grooves having the same width as in claim 35, or a 5 μ m width as in claim 47. The advantage of the present construction is that the width of the grooves 15 (S in Figure 2D) is extremely small, such that the conductive layer 14 covers almost the entire substrate. In addition, all of the grooves 15 can be precisely formed using a laser beam having the stated width.

35 USC §103(a) Rejections Of Claims 26, 27, 29, 30, 32, 33, 36, 37, 48-50, 52 and 53 Over Chou et al. and Rostoker et al.

The rejections of claims 26, 27, 29, 36, 37 and 48-50 over Chou et al. and Rostoker et al. are submitted to have been overcome by the previously discussed amendments to independent claims 25, 35 and 47. In particular, the combination of Chou et al. and Rostoker et al. does not teach or suggest a component having "micron sized grooves", "equal micro sized grooves" or "5 μ m grooves" which define a pattern of conductors. In addition, the cited combination does not teach or disclose a conductive layer with the "grooves" therein, which "substantially covers the substrate".

Independent claims 30 and 52 have also been amended with similar recitations, such that the rejections of claim 32, 33, and 52 is submitted to have been overcome. In particular, independent claims 30 and 52 include the recitation of the grooves having "a same micron sized width".

As argued in the previous Amendment, the 35 USC §103 rejections over Chou et al. and Rostoker et al. are further traversed, as Rostoker et al. has an effective date of 12/29/1998, which is after the 07/06/1998 priority date of the present application. In this regard, the present application is a continuation of serial no. 09/110,232, Patent No. 6,107,119, filed on 07/06/1998.

In response to this argument, the Examiner maintains that the priority date of Rostoker et al. is December 1997, which is the issue date of Liu et al. (US Patent No. 5,693,568) cited during prosecution of Rostoker et al. This holding is in error, as Rostoker et al. does not have the priority date of it's cited prior art. If the Examiner's analysis were correct, patents would have an effective date equal to their earliest cited art. For example, a patent filed in 2005 citing an 1898 patent would have an effective date of 1898. However, 35 USC §103 requires obviousness to be assessed from the view point of "one skilled in the art at the time of the invention", which in this case is 07/06/1998. The teachings of Rostoker et al. including it's cited art, were not available to the present inventors until 12/29/1998, which is after the time of the invention.

35 USC §103(a) Rejections Of Claims 28, 38 and 39 Over Chou et al. and Rowe et al.

The rejections of claims 28, 38 and 39 are submitted to have been overcome by the previously discussed amendments to independent claims 25 and 35.

With regard to these rejections, Rowe et al. was cited as teaching a conductive layer having a thickness of about 25 microns. However, the combination of Chou et al. and

Rowe et al. does not teach or suggest a component having "micron sized grooves" which define a pattern of conductors. In addition, the cited combination does not teach or disclose a conductive layer which "substantially covers the substrate".

Also in support of these rejections the Office Action states:

"Furthermore, determination of parameters such as conductor thickness, width/spacing, pad/via dimensions, shape/profile, number of such conductors/pads/vias, etc. in chip packaging and interconnection technology art is a subject of routine experimentation and optimization to achieve the desired electrical characteristics including impedance, signal-to-noise ration, etc., operating speed, performance and reliability."

However, there is no suggestion in the art of grooves having the stated width which are used to define conductors in a conductive layer which substantially covers the substrate. As previously argued, the conventional wisdom in the art is to remove all portions of a conductive layer which do not form the conductors or mounting paddle for the die. However, the present invention makes the grooves as small as possible, so that most of the conductive layer remains. Accordingly, these limitations are submitted to be more than just parametric recitations.

35 USC §103(a) Rejections Of Claims 31 and 34 Over Chou et al. and Rostoker et al.

The rejections of claims 31 and 34 are submitted to have been overcome by the previously discussed amendments to independent claim 30. In addition, the rejections are traversed because as previously discussed, Rostoker et al. has an effective date subsequent to the priority date of the present application.

Amendments To Dependent Claims

In addition to the amendments to the independent claims, dependent claims 28, 38 and 50 have been amended to recite "a thickness of the conductive layer and the width are selected to facilitate laser machining of the grooves."

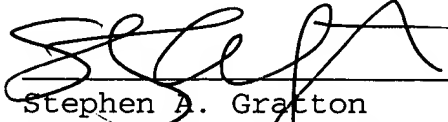
The Examiner has previously characterized similar recitations in the independent claims as being "method of manufacture" recitations having no significance in apparatus claims. However, these recitations describe a physical feature of the component (i.e., it's adaptability to laser machining) rather than it's method of manufacture. If a product has features which facilitate manufacture, patentability can reside in the product rather than the method of manufacture.

Conclusion

In view of the amendments and arguments, favorable consideration and allowance of claims 25-39 and 47-53 is requested. Should any issues remain, the Examiner is asked to contact the undersigned by telephone.

DATED this 4th day of January, 2005.

Respectfully submitted:



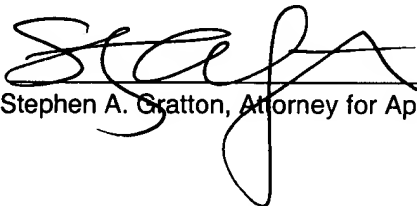
Stephen A. Gratton
Registration No. 28,418
Attorney for Applicant

2764 South Braun Way
Lakewood, CO 80228
Telephone: (303) 989 6353
Fax: (303) 989 6538

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Stephen A. Gratton, Attorney for Applicant